Claim 21 (New Claim) The product of Claim 9 wherein the average pore size is from about 0.075 microns to about 10 microns and the reduced mean particle size is less than about 100 microns.

Claim 22 (New Claim) The product of Claim 16 wherein the average pore size is from about 0.075 microns to about 10 microns and the reduced mean particle size is less than about 100 microns.

Remarks

Applicant has carefully reviewed the Examiner's communication mailed October 4, 2002.

The Examiner has objected to Applicant's claim for the benefit of the earlier filing date of Application No. 09/167,320 filed October 6, 1998 because all of the present claims contain material not previously disclosed in the prior application. Applicant has carefully reviewed the prior Application No. 09/167,320 and has amended Claims 1, 4, 5, 9, 11, 16 and 18 and canceled Claims 12 and 19 in order to have the claimed invention fully supported by the specification in Application No. 09/167,320. Claims that have not been amended and new Claims 21 and 22 also are fully supported by the specification in Application No. 09/167,320. In view of the amendments to the claims Applicant submits that the claims are entitled to the benefit of the filing date of the parent application, and therefore is appropriately called a division as is set forth in the specification. Applicant requests the Examiner to withdraw the objection to the specification.

The Examiner has objected to Claims 1, 9 and 16 as to the use of the word "a" before the word "contact". Applicant has amended the claims to correct the informality.

The Examiner has objected to Claim 5 as to the omission of the word "agent". Applicant has amended Claims 4 and 5 to delete the phrase "surface active agent" and to substitute in place thereof "surfactant." The specific support for the word surfactant is found at page 6 line 11 and finds corresponding support in the parent application. The Examiner has rejected Claims 1-20 under 35 U.S.C. 112 first paragraph.

The Examiner has specifically rejected Claims 1, 9 and 16 as to the use of the phrase "internal surface modifier component." Applicant has amended Claims 1, 9 and 16 to delete the above phrase.

The Examiner has further rejected Claims 9, 11, 16 and 18 as to the use of the phrase "functional agent." Applicant has amended Claims 9, 11 and 16 to further define functional agent as a "functional additive agent." Specific support for such term is found at page 9 lines 3-6. The use of the term functional agent and additive is fully supported in the specification of the parent application and further defines that which is recognized in the art as being suitable for use in polymer products. In view of the amendments to the claims Applicant requests the Examiner to withdraw the rejections to Claims 1, 9, 11, 16 and 18.

The Examiner has further rejected Claims 1-20 under 35 U.S.C. 112 second paragraph as being indefinite. The Examiner has rejected Claims 1, 9 and 16 specifically as to the phrase "which pores represent at least about 50% of the volume of the pores of the particles." Applicant has amended Claims 1, 9 and 16 to set forth that the pores represent at least about 40% of the total volume of the particles. Specific support for the use of the term 40% is found at page 4 lines 8-10. The Examiner also stated that it is unclear if Applicant intends to claim pores of non spherical geometry or particles of non

spherical geometry. Applicant has amended Claims 1, 9 and 16 to set forth that the porous organic polymer particles are resilient non spherical, elongated, porous particles. Specific support for such term to include "elongated" is found at page 3 lines 5-9.

The Examiner has rejected Claims 1, 9 and 16 since they do not disclose a step one. Applicant has amended Claims 1, 9 and 16 to make reference to step one.

The Examiner has further rejected Claims 1, 9 and 16 as to the use of the term "surface modifier component." Applicant has amended Claims 1, 9 and 16 to delete the above term.

The Examiner has rejected Claims 4 and 5 as to the use of the term "surface active agent." Applicant has amended Claims 4 and 5 to delete the term surface active agent and to use in place thereof the term "surfactant." Specific support for that term is set forth above. Applicant has set forth at page 6 lines 6-17 that surfactants can be added to the aqueous slurry to enhance wetting out of the surfaces of the pores of the particles. Further Applicant sets forth that the use of surfactants to assist in such change of polymer surface properties is well within the skill of the art. Applicant submits that the term surfactant is a well-recognized term used in the art and that a person of ordinary skill in the art would be apprised of the scope of the invention for dependent Claims 4 and 5. Further with the amendment of Claims 1, 9 and 16 to delete reference to the "internal surface modifier component," Applicant submits that the use of the term surfactant is definite in meaning and satisfies the requirements of 35 U.S.C. 112 second paragraph.

The Examiner has further rejected Claim 9 as to the use of the phrase "reloading the open cell pores with a functional agent" as being indefinite. Applicant has amended Claim 9 to delete reference to "reloading the open cell pores with a functional agent."

Applicant has amended both Claims 9 and 16 to set forth that the claimed product comprised both the resilient non spherical elongated porous polymer particles having the claimed mean particle size and pore size distribution and having a functional additive agent absorbed in at least a part of the pores of said particles. Specific support for the term functional additive agent absorbed within said pores is found at page 9 lines 3-10. In view of the amendments to the claims the use of the term reloading was not necessary in order for Applicant to define the claimed invention.

In view of the above remarks and amendments to the claims Applicant requests the Examiner to withdraw the rejection of Claims 1-20 under 35 U.S.C. 112 second paragraph.

The Examiner has rejected Claims 1, 4, 6, 7, 9-20 under 35 U.S.C. 102(b) as anticipated by or in the alternative under 35 U.S.C. 103(a) as obvious over Reimann et al. (U.S. 4,566,971). Applicant traverses this rejection as applied to the above claims.

Applicant has discovered patentably distinct new and unique resilient non spherical elongated porous organic polymer products having a mean particle less than about 150 microns and an average pore size distribution of from about 0.02 to about 15 microns. Applicant has discovered such new patentably distinct new products which also have unique properties, can be obtained when larger size porous organic polymer particles in an aqueous slurry are subjected to a cutting action. One of Applicant's major discoveries was that a non-spherical elongated porous polymer particle as set forth above could be produced. The claimed non spherical elongated porous particles are new and unique for resilient porous organic polymers. Thus new and unique resilient non spherical

elongated porous polymer particles are obtained under the aqueous slurry cutting conditions as set forth above.

As set forth in Applicant's specification, page 1 lines 11-25, page 2 lines 1-8, there is a substantial problem associated with reducing the mean particle size of porous organic polymer particles, which are resilient and which have open cell pores. As set forth at page 4 lines 4-18, the open cell pores are interconnected and that combined with the resiliency of the particles essentially allows the particles to be compressed under shear forces applied to the particles. Thus the porous particles are able to absorb forces through compressibility and changes in geometry, thus allowing the particles to be subject to size reduction forces and actions without significant size reduction. Thus as is set forth in Applicant's examples, Examples 1 to 4, Applicant is able to achieve substantial size reduction at very high processing efficiencies at short residence times. As set forth above the process produces patentably distinct new and unique non spherical elongated porous polymer particles which also have unique properties.

Applicant has set forth in the specification, for example page 2 lines 9-17, that boththe non spherical geometry and elongated geometry provide improved overall performance when such new particle products are used as an additive. Thus at line 2 Applicant describes the use of such non spherical elongated polymer particles of reduced particle size as being useful as additives in lead acid batteries. Further at lines 15-17 of page 2, new porous organic particles of this invention are described which are both non spherical and have higher surface area, properties which provide new and unique porous polymer products.

As set forth above the significant processing problems that confronted Applicant in processing resilient and compressible open cell porous polymer particles is significantly different than the processing of solid materials. The discovery that aqueous resilient porous organic polymer particle slurries comprising a major amount of water and a minor amount of such organic polymer particles, wherein the water is present in at least a part of the internal pores of said particles, i.e. not just the external water in the particles, in combination with a cutting action has been found to not only provide significant mean particle size reduction but also patentably distinct new and unique non spherical elongated porous organic polymer products, Page 3 lines 24-32, page 4 lines 1-4. As set forth above the non spherical elongated geometry, the higher surface area, the smaller size i.e. an average mean particle size less than 150 microns and a pore size distribution, enhances performance in a number of end use applications such as lead acid batteries. Further, the incorporation of additives into the internal pore structure of the particles, provides new and unique products. See for example page 9 lines 3-25.

Thus Applicant has discovered patentably distinct new and unique porous polymer particles that have (1) a non spherical geometry, (2) an elongated geometry, (3) a high surface area, (4) an average mean particle size distribution less than 150 microns, (5) an average pore size distribution of from about 0.02 to about 15 microns and (6) enhanced properties for use in applications such as lead acid batteries and the release of additives from the internal pore structure.

Applicant claims new and patentably distinct porous polymer particles. Applicant has illustrated (1) the new and unique claimed particles, (2) the properties of the claimed

particles and (3) the major advance in process technology that has provided for the production of these new products.

Applicant has amended independent Claims 1, 9 and 16 to clearly distinguish Applicant's claimed invention from the prior art references cited by the Examiner. Thus Applicant has set forth that the claimed particle products have (1) a non spherical and elongated geometry, (2) a mean particle size less than about 150 microns and (3) an average pore size distribution of from about 0.02 to about 15 microns. Applicant has retained in said claims the new and unique elements of the process which produce these patentably distinct new and unique polymer products. Applicant has further amended claims 9 and 16 to provide that the functional additive agent is absorbed in at least part of said pores of the above claimed porous polymer products. Further Claim 16 has been amended to set forth that Applicant claims a free flowing powder of organic polymer particles. Specific support for such amendments is found at page 4 lines 4-28.

As set forth in the Manual of Patent and Examining Procedure, Chapter 2131, "a claim is anticipated only if each and every element, as set forth in the claim is found either expressly or inherently described in a single prior art reference." Further, "the identical invention must be shown in as complete detail as is contained in the ... claim."

To establish a prima facie case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claimed limitations. The teaching or suggestion to make the

claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Applicant's disclosure.

Turning to the Reimann reference, Reimann discloses porous particles of from 1-5 mm in diameter which have pores of from 0.1-3 mm in diameter, column 2 lines 51-58. Further Reimann sets forth that the volume of the particles is preferably 0.1-125 cm^3. Further Reimann states that the volume values largely are consistent with diameter values of the particles of 5-50 mm. These values are again set forth at column 6 lines 61-68. Thus Reimann is concerned with very large particles having diameters of 5000-50,000 microns and pore sizes of from 100-3,000 microns. Further the volumes can be in the range up to 125 cm^3. Clearly each and every element as set forth in independent Claims 1, 9 and 16 is not found either expressly or inherently in the Reimann reference. As set forth above Applicant in Claims 1, 9 and 16 claims resilient non spherical elongated, i.e. a length to diameter that is different than one, i.e. not a sphere or cube, having an average mean particle size less than 150 microns and an average pore size distribution of from 0.02-15 microns. Clearly Reimann does not anticipate independent Claims 1, 9 and 16. In view of the above remarks Applicant requests the Examiner to withdraw the rejection of Claims 1, 4, 6, 7, 9-20 under 35 U.S.C. 102(b).

The Examiner has further rejected Claims 2, 3, 5 and 8 under 35 U.S.C. 103(a) as being unpatentable over Reimann et al. Applicant traverses this rejection as applied to the above claims. As set forth above Reimann discloses very large porous particles, i.e. up to 125 cm^3. The geometry disclosed by Reimann column 2 line 58 is a cubic form which would not be generally classified as elongated, i.e. a cubic form has the length, width and height of the same numeric value. As set forth above Applicant produces

patentably distinct new and unique non spherical elongated porous polymer particles having an average mean particle size less than 150 microns and a pore size distribution of from about 0.02 to about 15 microns. Applicant has set forth above the difficult problems associated with producing such claimed particles and the use of a new process which was capable of producing such new and unique polymer particle products. Thus the process conditions of Applicant produces new and distinct porous polymer products. Applicant has achieved these new and unobvious products and outstanding properties at fast processing conditions. As set forth above Reimann discloses very large particles, far different than those claimed by Applicant. Further, Reimann does not teach or suggest processes for producing Applicant's claimed polymer products. The Examiner has stated that it would have been obvious to reduce the particle size and the pore size of the carrier material motivated by a desire to produce a waste water purification material. As set forth above, to establish a prima facie case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation either in the reference or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. As set forth above, Reimann is not concerned nor does it teach or suggest Applicant's claim products, let alone processes for producing such new and unique products. Secondly, to establish obviousness there must be a reasonable expectation of success. Applicant discovered a new process that can use larger sized particles including spherical particles and convert them to reduced average mean size non spherical elongated porous polymer particles. Applicant discovered a new and unique process to produce new and unique products. Reimann does not teach or suggest processes for producing Applicant's claimed products and there would be no knowledge of such process or therefore a

reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claimed limitations. As set forth above, Reimann does not teach or suggest Applicant's claim products, the problems associated with the production of such new products, the difficulties inherent in producing non spherical elongated polymer products and the properties obtained for such polymer products. In view of the above remarks, Applicant requests the Examiner to withdraw the rejection of Claims 2, 3, 5 and 8 under 35 U.S.C. 103(a).

The Examiner has rejected Claims 1, 4, 9, 11, 12, 16, 18 and 19 under 35 U.S.C. 102(b) as anticipated by or in the alternative under 35 U.S.C. 103(a) as obvious over Webster et al. (U.S. 6,162,646). Applicant traverses this rejection as applied to the above claims.

Turning to the Webster et al. reference, Webster is directed at the use of large particles of approximately 1/8 inch to ¼ inch diameter, column 4 lines 4-7. Further at column 3 lines 51-53, Webster sets forth that the particles must be large enough for the pH indication to be seen by the user. In order to convert inches to microns, one inch is multiplied by 25,400. Thus Webster is only concerned with very large particles and clearly does not teach each and every element of Applicant's claims, as required for anticipation under 35 U.S.C. 102(b). As set forth above with respect to the Reimann reference, Applicant claims non spherical elongated porous polymer particles having an average mean size less than 150 microns and a pore size distribution of from about 0.02 to about 15 microns. Clearly each and every element of Applicant's claimed invention as set forth in Claims 1, 9 and 16 are not met by the Webster et al. reference. Further Applicant produces a new and patentably distinct porous polymer product using a new

and unique process. Applicant has set forth above the new and unique elements of the claimed products, the enhanced properties of such products, and the unique process for producing such products. Clearly Webster et al. provides no suggestion or motivation to one of ordinary skill in the art to produce Applicant's claimed products, let alone having any reasonable expectation of success in having a process to produce such products. In summary Webster et al. fail to teach or suggest any of the elements of Applicant's claimed invention. Thus, there is no suggestion or teaching of the new and unique porous polymer products, let alone these porous polymer products that have (1) a non spherical geometry, (2) an elongated geometry, (3) an average mean particle size of less than about 150 microns, (4) an average pore size distribution of from about 0.02 to about 15 microns and (5) the unexpected and unique properties of the claimed polymer products. Clearly Webster et al. fail to teach any of the above claimed elements of Applicant's invention and fail to show in any detail Applicant's invention. In view of the above remarks and the amendments to the claims Applicant requests the Examiner to withdraw the rejection of the above claims under 35 U.S.C. 102(b) and 35 U.S.C. 103(a).

In conclusion, Applicant submits that the present claims are patentably distinct and are allowable under 35 U.S.C. 112, first and second paragraph, 35 U.S.C. 102(b), and 35 U.S.C. 103(a) and respectfully requests the Examiner to forward this application to issuance at an early date.

Should any matters remain unresolved, the Examiner is requested to call (collect) Applicant's attorney at the numbers given below.

Attached hereto is a marked up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version With Markings To Show Changes Made.**"

Respectfully submitted,

Thomas J. Clough
Registration No. 22337
Attorney for Applicant
P.O. Box 718
Pismo Beach, California 93448
(805) 481-3750
Facsimile (805) 481-3452

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner of Patents and Trademarks, Washington, D.C. 29231 on or before Jan 6th, 2003.

Dated this 6th day of Jan., 2003.

Thomas J. Clough, Attorney

Version with Markings to Show Changes Made

Claim 1 (Once Amended) A porous resilient organic polymer product comprising resilient non-spherical elongated porous organic polymer particles having a mean particle size less than about 150 microns and a plurality of open cell pores having an average pore size distribution of from about 0.02 to about 15 microns [and internal surfaces] which pores represent at least about [50%] 40% of the total volume [of the pores] of the particles [and having a non-spherical geometry], said resilient non-spherical elongated porous particles produced by the process comprising (1) forming an aqueous particle slurry comprising a major amount of water and a minor amount of [said] larger size organic polymer particles [and an internal surface modifier component] said water being present in at least a part of the [internal] pores of [said] the larger size organic polymer particles to provide resistance to particle compressibility and external to [said] the larger size particles to form a slurry, (2) subjecting the aqueous slurry to a cutting action by [a] contact with a plurality of cutting surfaces to reduce the mean particle size of the larger size organic polymer particles [and distribute said surface modifier component on the internal surfaces] and (3) recovering said resilient non-spherical elongated porous particles[having a reduced mean particle size and modified surfaces].

Claim 2 (Once Amended) The product of Claim 1 wherein the [open cell mean pore diameter] average pore size is from about 0.075 microns to about 10 microns.

Claim 4 (Once Amended) The product of Claim 1 wherein a [surface active agent] surfactant is present in the aqueous slurry.

Claim 5 (Once Amended) The product of Claim 2 wherein a [surface active] surfactant is present in the aqueous slurry.

Claim 9 (Once Amended) A porous resilient organic polymer product comprising resilient non-spherical elongated porous organic polymer particles having a mean particle size less than about 150 microns and a plurality of open cell pores having an average pore size distribution of from about 0.02 to about 15 microns [and internal surfaces] which pores represent at least about [50%] 40% of the total volume [of the pores] of the particles [and having a non-spherical geometry] and [containing] a functional additive agent absorbed in at least a part of said pores, said resilient non-spherical elongated porous particles produced by the process comprising (1) forming an aqueous particle

slurry comprising a major amount of water and a minor amount of [said] larger size organic polymer particles [and an internal surface modifier component] said water being present in at least a part of the [internal] pores of [said] the larger size organic polymer particles to provide resistance to particle compressibility and external to [said] the larger size particles to form a slurry, (2) subjecting the aqueous slurry to a cutting action by [a] contact with a plurality of cutting surfaces to reduce the mean particle size of the larger size organic polymer particles [and distribute said surface modifier component on the internal surfaces] and (3) recovering said resilient non-spherical elongated porous particles [of reduced mean particle size and internal pore water and (4) reloading the open cell pores with a functional agent].

Claim 11 (Once Amended) The product of Claim 9 wherein the functional additive agent is one or more agents suitable for use as additives in polymer products.

Claim 16 (Once Amended) A [free flowing] porous resilient organic polymer product [powder] comprising a free flowing powder of resilient non-spherical elongated porous organic polymer particles having a mean particle size less than about 150 microns and open cell pores having an average pore size distribution of from about 0.02 to about 15 microns [and internal surfaces] which pores represent at least about [50%] 40% of the total volume [of the pores] of the particles [and having a non-spherical geometry] and [containing] a functional additive agent absorbed in at least a part of said pores, said resilient non-spherical elongated porous particles produced by the process comprising (1) forming an aqueous particle slurry comprising a major amount of water and a minor amount of [said] larger size organic polymer particles [and an internal surface modifier component] said water being present in at least a part of the [internal] pores of [said] the larger size organic polymer particles to provide resistance to particle compressibility and external to [said] the larger size particles to form a slurry, (2) subjecting the aqueous slurry to a cutting action by [a] contact with a plurality of cutting surfaces to reduce the mean particle size of the larger size organic polymer particles [and distribute said surface modifier component on the internal surfaces] and (3) recovering said resilient non-spherical elongated porous particles [of reduced mean particle size and internal pore water].

Claim 18 (Once Amended) The product of Claim 16 wherein the functional additive agent is one or more agents suitable for use as additives in polymer products.

Underline – Added Material
Brackets [] – Deleted Material